Invasive Species Campaign

Description

Invasive species are defined as non-native organisms whose introduction cause or are likely to cause environmental harm. Worldwide and within Illinois, invasive species are a primary threat to species of wildlife, the integrity of natural communities, and the quality of habitats. Invasive species are a leading cause of extinctions worldwide, and, in Illinois, are a contributing factor to the listing of a majority of the Species in Greatest Conservation Need (SGCN).

In Illinois, invasive species can come from all groups of organisms, including plants, invertebrate animals, vertebrate animals, and pathogens. Current examples of invasive species that are impacting the state include exotic bush honeysuckles (*Lonicera maackii, L. morrowii*, and *L. tatarica*), Asian carp (*Hypophthalmichthys molitrix* and *H. nobilis*), Emerald Ash Borer (*Agrilus planipennis*), and Viral Hemorrhagic Septicemia (VHS).

This campaign crosses habitats and addresses all taxa of invasive species. As such, it is applicable to any conservation project in Illinois. All aspects of invasive species management, including control, monitoring, early detection and rapid response, prevention, outreach, and restoration are addressed within the actions set forth by this campaign.

The actions included within this campaign section are provided to help guide the next 10 years of implementation. While other actions may be needed and larger goals could be set, the campaign prioritizes the actions contained in this section as realistic, achievable and most needed within the next 10 years to best aid in meeting the overarching goals of the Wildlife Action Plan to 1. Establish desired number and distribution of viable populations for each SGCN, 2. Manage habitats through promoting natural processes, desired structure, and disturbance regimes for the benefit of native species, and 3. Develop resiliency and connectedness into habitats so species can adjust to landscape and environmental changes.

Goals

Managing current and preventing new introductions of invasive species will aid in reducing the direct and indirect impacts these exotic organisms have on our Species in Greatest Conservation Need. Invasive species alter the health of habitats in Illinois, directly impacting that habitat's resiliency and ability to adjust to landscape and environmental changes. The actions in this campaign were designed to reduce or remove stressors that limit the population size, range, and health of our SGCN as well as improve habitats that benefit the native species of Illinois.

Goals for the invasive species campaign include:

- Create a comprehensive, integrated approach to addressing invasive species that crosses jurisdictional, organizational, and agency boundaries;
- Identify key invasive species and situations that are impacting Species in Greatest Conservation Need and the habitats they rely on and take actions to reduce or negate those current negative effects;
- Identify invasive species that pose a future threat to SGCN, and prevent their introduction into or spread throughout Illinois;

- Maintain and restore health of populations of our SGCN to decrease likelihood of contraction and impacts of exotic diseases and pathogens;
- Develop robust policy, protocols, and regulations for Illinois to address invasive species introduction, use, and transport;
- Increase awareness of invasive species in Illinois and foster the acquisition of the knowledge, skills, and abilities necessary for effective management, particularly on private lands.

Climate Change

Illinois will be affected directly and indirectly by a changing climate over the next 100 years. Climate models indicate a potential increase in mean annual temperature of 2 to 7 °F for this region. Projections for precipitation show an increase in winter and spring precipitation. There is high agreement among multiple lines of evidence that many invasive plants, insect pests, and pathogens will increase or become more severe. Several species, for example, are likely to have stronger or more widespread effects on forest composition and structure under the projected climate. Some drought- and fire-tolerant invasive plants, such as Sericea Lespedeza (*Lespedeza cuneata*), may also benefit from projected climate changes. In addition, a warming climate may make conditions more favorable for invasive species that are currently invading from farther south. However, uncertainty pervades predictions because of the lack adequate data on species and because some species depend on complex, incompletely understood unstable relationships. While targeted research will increase our confidence in making predictions, some uncertainty will always persist. Therefore, policies should allow for this uncertainty by considering a wide range of possible scenarios.

Status as of 2015

Invasive species continue to expand throughout the state. They remain a primary challenge to conserving and maintaining the rich biodiversity of Illinois, in particular the conservation of our rare wildlife species and the habitats they depend upon. Since the publication of the original Illinois Wildlife Action Plan (2005) many invasive species have expanded their range in Illinois. For example, previously confined largely to far southern Illinois, Japanese Stiltgrass (*Microstegium vimineum*) has experienced an explosive range expansion. As of 2015, Stiltgrass can be found in at least 26 counties, including several locations in far northern Illinois. Emerald Ash Borer (*Agrilus planipennis*) was first found in Illinois in 2006, but since has continued to expand its range. As of 2015, Emerald ash borer has been found in 310 communities and 50 counties. Teasel (*Dipsacus* sp.) while being present in Illinois for a long time, has continued to expand its range and can be found along almost any major transportation right-of-way in the state.

Since 2005, several exotic species that have become (or have the potential to become) invasive have been found in Illinois:

Plants: Japanese Chaff Flower, *Achyranthes japonica* (2008); †Giant Hogweed, *Heracleum mantegazzianum* (2006); Smallflower Saltcedar, *Tamarix Parviflora* (2012); Hyssop Loosestrife, *Lythrum hyssopifolium* (2011); Parrotfeather Milfoil, *Myriophyllum aquaticum* (2008); Sacred lotus, *Nelumbo nucifera* (2012); Reed Mannagrass, *Glyceria maxima* (2006)

Insects: Emerald Ash Borer, *Agrilus planipennis* (2006); Brown Marmorated stinkbug, Halyomorpha halys (2009); *Velvet Longhorn Beetle, *Trichoferus campestris* (2009)

Pathogens: Viral Hemorrhagic Septicemia, VHS (2008); Ranavirus, (2012); White-nose Syndrome, causal agent *Pseudogymnoascus destructans* (2013)

Animals: Corbiculid Clam, *Corbicula largillierti* (2008); Mottled Fingernail Clam, *Eupera cubensis* (2006); *Red Swamp Crayfish, *Procambarus clarkii* (2010); Quagga Mussel, *Dreissena rostriformis bugensis* (2005);

**= discovered but not known to be established in Illinois*
†= thought to be eradicated from Illinois (as of 2015)

However, even with expanding populations of invasive species and continued introduction of new species, significant progress has been made since the original Illinois Wildlife Action Plan was written (2005).

Three cooperative weed management areas (CWMAs) have been established in Illinois. These local partnerships plan, prioritize, and coordinate invasive plant actions across agencies and organizations in a defined area. The two most well-established CWMAs in Illinois are the River to River Cooperative Weed Management Area in southern Illinois and the Northeast Illinois Invasive Plant Partnership in Northeastern Illinois. Additional CWMAs are being established in other regions of Illinois. Other local partnerships also collaboratively address invasive species. One example is the Clifftop Alliance in southwestern Illinois.

Exotic Plant Strike Teams are proving to be an effective means of controlling priority populations of invasive plants and to implement Rapid Response for new infestations. These teams also provide crucial data collection and mapping functions, which help inform priority-setting for their region and the entire state. As of 2015, Strike teams are functioning in southern, northwestern, and northeastern Illinois.

The Illinois Invasive Plant Species Council has been established and serves as the avenue for enhanced communication between land management agencies and the horticulture industry. This council has developed a strategic plan that corresponds with the Wildlife Action Plan's Invasive Species Campaign. Additionally, the council has developed and initiated a species assessment protocol to review and make recommendations for the regulation of plant species.

Illinois Invasive Species Awareness Month (ISAM) was established in 2010 to create a concerted, statewide effort to raise awareness about invasive species issues. Many local, state, and federal agencies and organizations participate in ISAM by hosting events and programs. Between 2010 and 2015, over 550 events have been held as part of ISAM. Starting in 2014, an annual Invasive Species Symposium has been held to highlight and update invasive species projects and initiatives in Illinois.

Illinois has ramped-up efforts on Asian Carp (*Hypophthalmichthys molitrix* and *H. nobilis)* during the last ten years, including hiring new biologists that deal primarily with carp, reinforcing the electric barrier with the Chicago Area Waterway System and contracting commercial fishermen as means of preventing carp from entering the Great Lakes watershed. The electronic barrier, which was installed in 2002, was upgraded and repaired in 2008 with additional barriers added in 2009 and 2011. A more detailed discussion on the status of the Asian carp efforts is included in the Streams Campaign section (Page XX)

The 2006 discovery of Emerald Ash Borer (*Agrilus planipennis)* in Illinois has drastically changed the urban forests, urban forestry, and forest health in Illinois. The Illinois Department of Agriculture and USDA-APHIS lead an aggressive response that included quarantines, educational campaigns, new regulations, and grants to assist in removal and replanting.

Wildlife health continues to be an important aspect of wildlife management. Recent discoveries of exotic diseases, such as Ranavirus, Snake Fungal Disease, White-nose Syndrome, and Viral Hemorrhagic Septicemia have wide impacts on our native wildlife, including SGCN. The exotic Faucet Snail (*Bithynia tentaculat*), is invading the Mississippi River and has recently been found in the river adjacent to northern Illinois. This snail harbors pathogenic helminthes (*Cyathocotyle bushiensis and Sphaeridiotrema pseudoglobulus*). These helminths, when consumed by waterfowl or other water birds, cause internal hemorrhaging and death. Efforts have ramped up in terms of response to these issues, particularly with Chronic Wasting Disease, CWD, in white-tailed deer and the exotic diseases impacting herpetofauna . Recent efforts to develop statewide wildlife health programs and wildlife disease response plans have started and are a promising advance of this important issue.

Launched in 2011, the Illinois-Indiana Sea Grant Sea Grants' Clean Boats Crew is a volunteer outreach program that empowers the public to keep their waters free from aquatic invasive species (AIS). Clean Boats Crew members talk with boaters, anglers, and other recreational water users at local boat ramps about AIS and apply simple steps to prevent transfer of AIS from one waterbody to another. From 2011 to 2014, Clean Boat Crews reported a total of 8,964 contacts with recreational water users about what they can do to decrease the likelihood that their equipment is carrying AIS from lake to lake.

The public's familiarity with and knowledge about invasive species has increased dramatically since 2005, in large part due to the efforts outlined in the original Invasive Species Campaign. Currently Illinois citizens, in general, know about invasive species and understand that they can be a threat.

Several state regulations and rules have been created or amended to better address invasive species.

- In 2005, the Illinois Injurious Species Rule (17 IAC Sec. 805) was amended to include the three Asian carp species and in 2013, the rule was again amended to include 27 invasive aquatic plant species as injurious species, making it illegal to possess, propagate, buy, sell, barter, trade, or transport them;
- In 2006, under the authority of the Insect Pest and Plant Disease Act (505 ILCS 90/1 et seq.), an internal quarantine was established to limit the spread of emerald ash borer through regulating the movement of ash wood material and hardwood firewood. This internal quarantine has been amended 11 times in response to the expanding range of emerald ash borer;
- In 2008, USEPA amended rules for ballast water discharge to help prevent introduction of new aquatic invasive species in the Great Lakes (Vessel General Permit, VGP). In 2013, these rules were reissued;
- In 2012, under the authority of the Insect Pest and Plant Disease Act (505 ILCS 90/1 et seq.), an external quarantine was established to prevent the introduction of the causal agents of Thousand Cankers Disease through regulating the introduction and movement of walnut wood material;
- In 2013, the Boat Registration and Safety Act (625 ILCS 45/5-23 new) was amended to make it illegal for any person to place or operate a vehicle, seaplane, watercraft, or other object of any

kind in waters of this State if it has any aquatic plants or aquatic animals attached to the exterior of the vehicle, seaplane, watercraft, or other object (excluding duckweed);
- In 2014, a section was added to the Illinois Administrative Code to regulate wild swine (17 Ill. Adm. Code 700). This addition regulates the importation, possession, release, take, sale, and propagation of wild swine in Illinois.

Stressors/Threats

The mechanisms that are utilized by invasive species to impact native wildlife species and the scale of those impacts are extremely variable. In general, invasive species can act as stressors or threats to native wildlife species in three ways. Some invasive animal species directly compete for the same natural resources and life requirements (food, water, space, shelter) as native species. For example, the Round Goby (*Neogobius melanostomus*) has a well developed sensory system that enhances its ability to detect water movement. This allows it to feed in complete darkness, giving it an advantage over native fish in the same habitat. Invasive species can displace native plant communities and/or radically change the nature of the habitats they invade. Through their impacts on species and ecosystem processes, invasive species can result in the fragmentation, destruction, alteration or complete replacement of habitats which in turn, has cascading effects on even more species and ecosystem processes. Some examples of these impacts include the following: studies have demonstrated that songbirds often use exotic plants as nesting substrates and may suffer elevated predation rates relative to nests placed in native plants; common carp have a stronger influence on water quality and aquatic community structure than benthic fish native to Illinois; or the destructive feeding habits of Feral Swine (*Sus scrofa*), primarily rooting disturbance, can reduce plant cover, diversity, and regeneration. Invasive pathogenic microbes are introduced microorganisms which are usually single-celled, or too small for the unaided eye to see, including bacteria, viruses, protists, and fungi. Some pathogenic invasive species cause direct mortality to native wildlife or impact their health or fecundity is such a way as to impact the overall population. Examples of this would be ranavirus decreasing survivorship and fecundity of eastern box turtles or increased mortality of Eastern Massasauga individuals due to Snake Fungal Disease (causal agent *Ophidiomyces ophidiicola*). When in combination with other stressors, such as climate change, fragmentation, and habitat loss, impacts from invasive species are often exacerbated.

Before any specific invasive species can impact native wildlife, it must first arrive to Illinois. Invasive species are introduced into Illinois via three major pathways:

1. **Intentional Introductions –** Some species of plants, animals, and microorganisms have been spread by humans over much wider ranges than they occupied naturally. Some of these introductions have and continue to be deliberate in Illinois most often with the intention to improve conditions for some human activity such as; benefiting agriculture, aquiculture, or other economic interests; improving wildlife habitat; purposes of sport fishing and hunting, horticultural escapes (included here because their initial transport to a new region is human motivated), pets, and erosion control. While most of the exotic species are benign or even beneficial, some of these introductions result in naturalization of species which are highly invasive. Examples of intentionally introduced species include Kudzu Vine (*Pueraria montana*)

introduced for erosion control and as livestock forage, Feral Swine introduced for hunting opportunities, and Multiflora Rose (*Rosa multiflora*) introduced for agriculture and wildlife.

2. **Accidental introductions -** Other introductions are accidental, as when plants are introduced with soil; transported as ballast in ships; or insects were transported with timber or food. Illinois has structural features that increase its susceptibility to accidental invasions. Chicago for example, is the largest inland general cargo port in America, and the city as a whole is the commercial transportation hub of the nation. International ports via air and water mean Illinois has been and should expect to continue to be a point-of-origin for biological invasions. These invasions can occur as a result of direct importation into Illinois from overseas, or indirectly, through domestic redistribution of species that have invaded other parts of the U.S. The state's massive transportation infrastructure facilitates the spread of established invasive species throughout the state. Examples of accidental introductions into Illinois include Asian Longhorn Beetle (*Anoplophora glabripennis*), which was directly introduced into Chicago through imported wood packing material, and the Emerald Ash Borer (*Agrilus planipennis*), which originally invaded the state of Michigan through imported wood packing material and was then likely introduced into Illinois through domestic movement of firewood and/or other wood products.

3. **Natural spread from introductions in adjacent regions** – Illinois is a diverse state that touches four major physiographic regions (Central Lowland, Interior Low Plateau, Ozark Plateau, and Coastal Plain) and bridges two major watersheds (Great Lakes and Mississippi River). Illinois is bordered by two of the largest river systems in North America (Mississippi and Ohio Rivers). Because of these factors and Illinois' location within the United States, the state is at high risk of invasive species, spreading naturally from other regions of the country. Examples include: Japanese Stiltgrass (Microstegium vimineum) and Japanese Chaff Flower (*Achyranthes japonica*) likely made their way into Illinois by moving down the Ohio River; saltcedar (*Tamarix* sp.) down the Mississippi River, and White-nose Syndrome (causal agent *Pseudogymnoascus destructans*) introduced via migrating bat species.

Unfortunately many of these methods of introduction are difficult to curtail, resulting in constant introductions of new species. As detailed above, since the publication of the original IWAP, at least 18 new invasive species have been discovered in Illinois. With the 'community' of invasive species in Illinois continually changing and new, often poorly understood, invasive species being introduced each year, mitigating actions and priorities must also continually change through updates and reprioritization.

Exotic invasive plant species impact native wildlife chiefly through habitat modification and outcompeting native plant species necessary for forage and habitat. Many of the invasive plants in Illinois can disperse easily and rapidly spread through the landscape once introduced. Invasive plant species that have the ability to invade and alter high-quality natural communities are particularly threatening to our SGCN since these high-quality remnants are often strongholds for populations of SGCN. Altering habitat suitability may not directly lead to mortality of a SGCN, but can alter fecundity, health, survivorship, susceptibility to predation from other wildlife species (including native species), etc.

Exotic invasive wildlife species, including exotic invasive insects, can directly compete with native wildlife, including SGCN, for limited resources. Some exotic invasive wildlife species may also modify habitat and alter suitability and quantity for SGCN. In addition, some exotic invasive wildlife may

directly consume SGCN. These impacts lead both to directly mortality of individuals of a SGCN but also reductions in reproduction, health, survivorship, etc.

Exotic invasive pathogens can either directly impact native wildlife, including SGCN or impact native plant species used as forage or habitat. Direct pathogenic impacts to native wildlife influence population dynamics and even survivability of a species or population. Pathogenic invasive species could increase mortality, reduce fecundity, increase stress and susceptibility to other diseases or climatic conditions, or other means of impacting wildlife populations. Indirect impacts, through influencing plant species used for forage or habitat is similar to the potential impacts from invasive insects.

Each campaign within the Wildlife Action Plan addresses the threat of invasive species. Listed below are priority invasive species for each of the other campaigns:

Forest and Woodlands Campaign:

- Exotic invasive shrubs, such as bush honeysuckle (*Lonicera maackii*, *L. tatarica*, and *L. morrowii*), autumn olive (*Elaeagnus umbellata*), common buckthorn (*Rhamnus cathartica*), and burning bush (*Euonymus alatus*);
- White-nose Syndrome (causal agent *Pseudogymnoascus destructans*);
- Garlic Mustard (*Alliaria petiolata*);
- Feral Swine (*Sus scrofa*);
- Forest insect pests such as Emerald Ash Borer (*Agrilus planipennis*) and Gypsy Moth (*Lymantria dispar*).

Streams Campaign:

- Bighead Carp (*Hypophthalmichthys nobilis*), Black Carp (*Mylopharyngodon piceus)*, Grass Carp (*Ctenopharyngodon idella)*, Silver Carp (*Hypophthalmichthys molitrix*)) and Common Carp (*Cyprinus carpio);*
- Chinese Mystery Snail (*Cipangopaludina chinensis*) and Faucet Snail (*Bithynia tentaculata*)
- Dreissenid mussels (Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena rostriformis bugensis*);
- Round Goby (*Neogobius melanostomus*) and Tubenose Goby (*Proterorhinus marmoratus*);
- Rusty Crayfish (*Orconectes rusticus*);
- Purple Loosestrife (*Lythrum salicaria*) and Eurasian Milfoil (*Myriophyllum spicatum*);
- VHS (Viral Hemorrhagic Septicemia) ;
- Potential threats also include Didymo (*Didymosphenia geminata*) and New Zealand Mudsnail (*Potamopyrgus antipodarum*).

Farmland and Prairie Campaign:

- Exotic cool season grasses, such as Smooth Brome (*Bromus inermis*) and Tall Fescue (*Schedonorus arundinaceus*);
- Autumn Olive (*Elaeagnus umbellata*);
- Sericea Lespedeza (*Lespedeza cuneata*);
- Exotic composites such as teasel (*Dipsacus* sp.), exotic thistles (*Cirsium* sp. and *Carduus nutans*), and knapweeds (*Centaurea* sp.);

- Multiflora Rose (*Rosa multiflora*).

Wetlands Campaign:

- Phragmites (*Phragmites australis*);
- Reed Canarygrass (*Phalaris arundinacea*);
- Purple Loosestrife (*Lythrum salicaria*);
- Narrow-leaved and Hybrid Cattails (*Typha angustifolia* and *T. ×glauca*);
- Disease/pathogens for herpetofauna such as *Ranavirus* and Chytrid fungus (*Batrachochytrium dendrobatidis*);
- Common and Grass Carp (*Cyprinus carpio* and *Ctenopharyngodon idella*).

Green Cities Campaign:

- Emerald Ash Borer (*Agrilus planipennis*);
- Invasive ornamental/landscaping plants such as Japanese Barberry (*Berberis thunbergii*), Burning Bush (*Euonymus alatus*), and Callery Pear (*Pyrus calleryana*);
- Exotic bush honeysuckles (*Lonicera maackii*, *L. tatarica*, and *L. morrowii*);
- Garlic Mustard (*Alliaria petiolata*);
- Common and Glossy Buckthorns (*Rhamnus cathartica* and *Frangula alnus*).

Lake Michigan Coastal Campaign:

- Phragmites (*Phragmites australis);*
- Narrowleaf Cattail (*Typha angustifolia*); and hybrids
- Round Goby (*Neogobius melanostomus*);
- Zebra Mussel (*Dreissena polymorpha*) and Quagga Mussel (*Dreissena bugensis*);
- Exotic waterfleas including Spiny Waterflea (*Bythotrephes longimanus*) and Fishhook Waterflea (*Cercopagis pengoi*);
- Sea Lamprey (*Petromyzon marinus*).

Focal Species in Greatest Conservation Need

The original Illinois Wildlife Action Plan (2005) Appendix II (Status, Objectives, and Stresses to Illinois' Wildlife & Habitat Resources) included invasive species in both the ranked Habitat Stresses and Community Stresses to SGCN and to habitats in Illinois. Nearly 60% of the SGCN listed in Appendix II were rated as 'Invasive Species having or is likely to have a moderate to severe effect on population viability or abundance'. This includes 52% of mussels, 66% of fishes, 24% of herpetofauna, 91% of birds, and 3% of mammals. Similarly, 95% of habitats had invasive species rated as a moderate (7/41) or severe (32/41) threat.

With changes in the SGCN list, new invasive species being found in the state, and a better understanding of the impacts of invasive species on wildlife, those numbers have changed in this revision. Currently, XX% of SGCN listed in Appendix II are rated as 'Invasive species having or is likely to have a moderate to severe effect on population viability or abundance'. This includes XX% of mussels, XX% of fishes, XX% of herpetofauna, XX% of birds, and XX% of mammals.

Comment [CE1]: This paragraph depends upon the results and the structure of the new SGCN table. This is in here as a place-holder until that table is finalized.

Comment [CE2]: This paragraph depends upon the results and the structure of the new SGCN table. This is in here as a place-holder until that table is finalized.

The Invasive Species Campaign addresses all habitats in Illinois and a majority of the SGCN that are threatened by invasive species, therefore this campaign does not have a narrowed, focused list of particular SGCN. Instead, the actions within this campaign were crafted to be applicable to many different invasive species and beneficial to a broad swath of SGCN. Specific actions to address an invasive species-related threat to a particular invasive species are included when warranted. Table X summarizes which SGCN that we have high confidence are severely threatened by invasive species, separated by campaign.

Comment [CE3]: This is also a place holder until the SGCN tables are finalized. I have this developed based upon the last IWAP but want to use the revised information here instead.

Management Resources

An updated list of links to documents, recommendations, contacts, grant opportunities, and other resources for the invasive species campaign, the other campaigns, and the wildlife action plan in general are found on the Illinois Wildlife Action Plan's website at:
http://www.dnr.illinois.gov/conservation/IWAP/Pages/default.aspx

Actions

Actions included within this campaign can be divided into Universal Management Recommendations and Targeted Actions. Universal Management Recommendations are on-the-ground practices that will benefit Illinois wildlife species, including SGCN, wherever they are implemented. Anyone that values wildlife and wants to contribute to meeting the overarching goals of the Illinois Wildlife Action Plan should consider implementing these practices where applicable. The Targeted Actions are specific, often place-based, actions designed to address a particular need, stressor, or situation.

Universal Management Recommendations

1. **Use Best Management Practices to prevent the introduction and spread of invasive species.**
    a. Clean mud, soil, and plant material from equipment, vehicles, boots, and clothing before moving to a new site;
    b. Inspect off-site material and equipment and ensure they are free of invasive plant seeds or other plant material before moving on-site;
    c. Monitor for new infestations of invasive species, particularly in areas with recent disturbance;
    d. Build in and enforce equipment cleaning requirements for any contract and grant work;
    e. Do not move animals from one area to another, particularly if they seem sick or unhealthy;
    f. Sanitize your hands, boots, and any equipment if working in an area with known wildlife disease outbreaks;
    g. Remove plants, animals, and mud from boats, trailers, and any other equipment;
    h. Drain water from live wells and bait buckets;
    i. Minimize transportation of firewood; buy it where you will burn it.

2. **Contribute to the overall knowledge of the distribution of invasive species in Illinois**
    a. Enter observations of invasive plants into online databases, such as the Early Detection and Distribution Mapping System (http://www.eddmaps.org) or the New Invaders Watch Program (http://www.newinvaders.org);
    b. Report sightings of Feral Swine to the Illinois Department of Natural Resources;

c. Report concentrations of sick and/or dead animals to the Illinois Department of Natural Resources;
d. Report concentrations of dead and/or dying trees to the Illinois Department of Natural Resources or the Illinois Department of Agriculture;
e. Report observations of invasive insects to USDA-APHIS-PPQ, Illinois Department of Agriculture or Illinois Natural History Survey.

3. Control existing infestations of invasive species

a. Priority for implementing control should be given to an Early Detection Rapid Response species, a species listed as a priority within the IWAP campaigns, a species designated as a priority by the local CWMA, or a species with the potential to impact SGCN habitat (see Appendix XX);
b. Use control methods proven to be safe and effective, such as the methods recommended in the Illinois Nature Preserves Vegetation Management Guidelines for plant species;
c. Include invasive species considerations in planning and evaluation of other restoration and management tasks.

4. Participate in local invasive species partnerships, such as Cooperative Weed Management Areas, if available

5. Use and promote native or non-invasive alternatives to plantings of invasive species

a. Native plants are preferable over non-invasive non-native plants because they play a critical ecological role in maintaining overall biodiversity.

6. Increase education and outreach efforts on invasive species, particularly to private landowners

a. Participate in Illinois Invasive Species Awareness Month (www.illinoisinvasives.org);
b. Organize field tours, presentations, or other events on invasive species;
c. Develop, use, and distribute educational materials on invasive species.

Targeted Actions

1. Establish collaborative Early Detection /Rapid Response and Spread Prevention programs

NEED: EDRR and Spread prevention are the most effective and cost-efficient means of controlling invasive species. These methods also work to control populations of invasive species before impacts to SGCN.

a. Develop regional Early Detection target list, based upon threat to SGCN or their habitats
   - Current statewide Early Detection priorities can be found in Table X.X;
b. Work cooperatively with adjacent states on regional Early Detection programs;
c. Develop Rapid Response protocols to use when a population of a target species is found
d. Increased promotion and use of native and non-invasive species for horticulture and landscaping;

e. Identify pathways of introduction and spread for new invasive species and ways to minimize these pathways;
f. Establish and use Best Management Practices for the prevention of spread and introduction of invasive species.

2. Create a comprehensive, integrated approach to addressing invasive species

NEED: A comprehensive integrated approach will help reduce redundancy, identify and address needs, and allow invasive species to be addressed in Illinois at a scale and scope necessary to reduce or remove the negative impacts to SGCN.

a. Develop an interagency invasive species management plan that defines roles, responsibilities, and priorities for each state agency and addresses all aspects of invasive species management – prevention (introduction and spread), early detection/rapid response, restoration, impact mitigation, survey/monitoring, regulation/enforcement, and control;
b. Foster existing Cooperative Weed Management Areas and other local invasive species partnerships in Illinois and establish at least two additional such partnerships in Campaign focal areas or Conservation Opportunity Areas to assist with implementation the Invasive Species Campaign actions;
c. Conduct an annual invasive species symposium for information sharing and updates to invasive species projects/programs in Illinois;
d. Promote the use of native or non-invasive species for landscaping, wildlife habitat and environmental planting. Native plants are preferable over non-invasive non-native plants because they play a critical ecological role in maintaining overall biodiversity;
e. Partner with neighboring states on regional invasive species groups, projects, or initiative.

3. Prioritize control of targeted locations to benefit SGCN

NEED: With limited funds for control efforts, address invasive species actions identified in the Wildlife Action habitat campaigns to benefit SGCN;

a. Control autumn olive and other exotic shrubs in grassland sites within the Pyramid-Arkland COA for the benefit of grassland bird SGCN, including Henslow's Sparrows and Grasshopper Sparrows;
b. Develop and implement mitigating practices to lessen the impact and transfer of White-nose Syndrome within Illinois' cave systems for the benefit of bat species, particularly SGCN;
c. Control bush honeysuckle and other exotic shrub species in forests utilized by nightjar SGCN for the benefit of Whip-poor-Wills and Chuck Will's Widows;
d. Control buckthorn in large blocks of forests in northern Illinois for the benefit of SGCN requiring open forest habitat and for amphibian species breeding in forested wetlands;
e. Control other populations of invasive species that have been deemed threatening or impactful to SGCN.

4. Increase capacity for invasive species management in Illinois

NEED: With invasive species being widespread in Illinois and impacts to SGCN being incurred on private and public lands, there is a strong need to enhance the capacity to manage invasive species across the state.

- **a.** Create and enhance existing platforms to increase access to technical and financial resources to private landowners for invasive species management practices that address threats to SGCN;
- **b.** Identify opportunities to establish additional Regional Invasive Plant Strike Teams, with the ability to work in focal and Conservation Opportunity Areas in the state;
- **c.** Provide regular training opportunities on safe and effective invasive species management techniques to landowners, land managers, and agency staff;
- **d.** Develop programs and policies that foster resource sharing between agencies.

5. Utilize the most up-to-date, current, and accurate information when managing invasive species

NEED: Success of management, benefits to wildlife, costs of management activities, and prioritization of limited resources all are influenced by the use of up-to-date, accurate information. Current information can help ensure that the most effective, safe, and cost-effective methods are being used and that resources are being spent to address the most-needed situations.

a. Identify research needs for controlling invasive species and work with researchers to establish projects to gather that information;
b. Update and expand the Illinois Nature Preserve Commission's Vegetation Management Guidelines on a regular basis for sensitive species and high quality natural areas;
c. Communicate, through a website or other platforms, known interactions of rare and invasive species and the control methods that had been used to manage invasive species in the presence of SGCN;
d. Provide land managers and private landowners with materials, resources, and opportunities for training in plant identification and cost-effective control practices
e. Improved tracking and monitoring of control efforts by improving the use and accessibility of weed information systems;
f. Establish a central database (such as www.eddmaps.org) for collecting and compiling distribution records of invasive species. Expand network of reporters by providing training and efficiency of reporting structure;
g. To facilitate documentation of interactions between rare and invasive species, incorporate assessments and observations of invasive species into Elemental Observation Record reporting.

6. Assess, improve, and update invasive species-related management plans, strategies, policies and regulations

NEED: Policies, plans, and regulations should be regularly assessed and updated to address new species being introduced to Illinois and any new knowledge about the impacts of invasion, pathways of spread, and management needs.

a. Review and update regulated species lists, such as the Illinois Exotic Weed Act List, the Illinois Injurious species List, and the Illinois Noxious Weed List on an annual basis;

b. Continue working with Illinois Invasive Species Plant Council to assess, categorize, and list invasive vascular plants according to their impact on native species and natural biodiversity;
c. Provide tools and resources to land managers and landowners necessary to **assess**, prioritize, and control **invasive species to aid in the development of** management plans.

7. Establish a Wildlife Health / Wildlife Disease program

NEED: Maintaining the health of wildlife, especially SGCN, and preventing or mitigating exotic wildlife diseases is a crucial aspect of wildlife management and to the goals and objectives of the Illinois Wildlife Action Plan. Having an established program to address these aspects is a strong need for the state.

a. Increase monitoring and reporting of wildlife health, particularly for SGCN;
b. Establish wildlife health monitoring protocols and baseline health information
c. Establish partnerships, programs, and funding necessary to allow for diagnosis and tracking of wildlife diseases;
d. Incorporate wildlife health measurements as an aspect of evaluating success of habitat restoration/management projects;
e. Train agency field staff and others on disease recognition and reporting procedures
f. Develop response protocols for disease outbreak scenarios.

8. Enhance land managers', land owners', and citizens of Illinois' knowledge and awareness of invasive species

NEED: Increasing knowledge and awareness is the critical first step to effective invasive species management. Having more people in Illinois aware of and concerned about invasive species helps gain support for management efforts.

a. Continue organization and wide participation in Illinois Invasive Species Awareness Month events;
b. Maintain an updated and comprehensive invasive species website for Illinois;
c. Develop Illinois-specific publications on invasive species and make them available both in printed and electronic forms;
d. Further incorporate invasive species into Master Naturalist / Master Gardener program curriculum;
e. Increase emphasis on invasive species interpretation at visitor centers, nature centers, etc.;
f. Continued inclusion of invasive species language in hunting and fishing digests
g. Install boot brush stations, including informational signage at trailheads
h. Install informational signage at boat ramps;
i. Support programs such as Clean Boats Crews and boat washing stations at popular boat launches.

9. Research the interactions between invasive species and their effects on native taxa, particularly SGCN

NEED: assessments and documentation of the impacts and interactions non-native species are having on SGCN. Use literature surveys and personal interviews to assess the information that is available on SGCN and non-native species interactions.

a. Support research that investigates the distribution of the exotic mollusks with Illinois and their impacts on SGCN. In particular, Faucet Snail (*Bithynia tentaculata)* and its effects on waterfowl; New Zealand Mudsnail (*Potamopyrgus antipodarum)* and its effects on fishes; and Chinese Mystery Snail (*Bellamya chinensis*) and its effects on native snails.
b. Support research that investigates the impacts of terrestrial and riparian invasive plant species on stream water condition and suitability for aquatic or semi-aquatic SGCN
c. Support research that investigates the impacts of exotic shrubs within forests and woodlands on avian SGCN
d. Support research that further investigates the effects of invasive species on other SGCN when potential impacts are indicated.
e. Document and assess the risks of fire, habitat degradation, competitive exclusion, and other threats caused by invasive species infestations on SGNC habitats
f. Identifying invasive weed species common among agency districts and sensitive species habitat

10. Implement invasive species-related actions from other Wildlife Action Plan Campaigns

Streams Campaign

Action Items:

- Support work of the Asian Carp Regional Coordinating Committee as described in the Asian Carp Control Strategy Framework and the Monitoring & Response Plan
- Assist the Invasive Species Campaign by conducting effectiveness monitoring & assessment.
- Develop and implement a sentinel monitoring program for detecting changes in distributions of known threats and identifying new aquatic invasive species or wildlife diseases in Illinois.
- Investigate the cumulative impacts of landuse alteration, climate change, and invasive species on SGCN and aquatic species assemblages.

Wetlands Campaign

Action Items:

- (2. Enhance habitat quality of existing wetlands) a. Manage wetlands to promote native plant communities by removing, reducing or controlling invasive species, especially:
  - Phragmites, Purple Loosestrife, Reed Canary-grass, Eurasian Water Milfoil, Water Hyacinth, Narrow-leaf Cattail, and others.
  - Common Carp, grass Carp, Silver Carp, Bighead Carp and other non-native fish.

Green Cities Campaign

Rockford Metropolitan Area

Action Items;

- (1. Streams and Rivers – Four Rivers and Riparian Areas) Kishwaukee River Watershed – invasive species control;
- (2. Oak Woodlands) Oak Savanna – control invasive species;
- (2. Oak Woodlands) Oak-Hickory Woodland – remove invasive trees and brush, and restore understory species;
- (3. Grasslands) – Long term habitat maintenance including burn regiment and invasive control.

Chicago Metropolitan Area

Action Items:

- (2. Oak Woodlands) Mesic Oak Woodlands – invasive species removal;
- (2. Oak Woodlands) Dry-Mesic Oak Woodlands – invasive species removal;
- (3. Wetlands) Fen Wetlands – Implement management that includes controlled burning (2- to 3- year rotations) and efforts to remove invasive woody and herbaceous species;
- (3. Wetlands) Fen Wetlands – Restore hydrology by removing woody invasive species and implementing steps (installing check dams to rehydrate the peat, and removing drain tiles) that restore hydrological function.

Universal Management Recommendations

- (10. Study urban areas for their importance or role in maintaining Illinois species of SGCN) – Study wildlife disease and potential zoonotic diseases.

Lake Michigan and Coastal Area Campaign

Action Items/Research Needs:

- Conduct or support invasive species research and monitoring on:
  - Zebra Mussel,
  - Quagga Mussel,
  - Sea Lamprey,
  - Round Goby,
  - Spiny Water Flea,
  - Fishhook Water Flea,
  - Emerging invasive species.
- Investigate the role Round Goby plays in the Lake Michigan ecosystem, both pro (food for Lake Trout, basses, and Lake Whitefish, etc.) and con (competition with Yellow Perch, darters, Mottled Sculpins, other sculpin species, etc.);
- Emerald Ash Borer planning and mitigation.

Action Items/Targeted Needs

- Control invasive plants in [Wetlands: Marsh, Sedge Meadow];
    - Phragmites, narrowlead cattail, red canarygrass, purple loosestrife.
- As feasible, exclude common carp from wetland restoration sites to protect native plants as they become established, and eradicate from high quality established wetlands. [Wetlands: Marsh. sedge Meadow];
- Monitor development in Zebra and Quagga Mussel control under consideration by the Invasive Mussel Collaborative [in Lake Michigan: Bedrock Outcrops, Cobble Reefs];
- Support targeted Sea Lamprey control efforts to limit losses due to predation by parasitic adult lamprey. [in Lake Michigan: Bedrock Outcrops, Cobble Reefs];
- Replace invasive plants with native species [in ravines];
- Control invasive plants including Phragmites and Lyme grass in [Lakeshore Communities: Foredune, Panne, Dune, and Swale];
- Control and prevent the spread of invasive species [in streams and waterways].
    - Curlyleaf Pondweed, Eurasian Watermilfoil, Dreissenid Mussels.

Forest and Woodlands Campaign

[Insert Forest and Woodland Invasive Species Actions]

Farmland and Prairie Campaign

Invasive species identified as habitat stressors to Grassland/Shrubland:

- Invasive species (e.g., tall fescue, reed canary grass, thistle species, autumn olive etc.) encroach on grasslands and shrublands and decrease habitat quality, change the structure/suitability of the habitat and displace native wildlife including SGCN;
- Invasive species can also make restoration of old pasture or early CRP plantings more complicated and labor intensive due to the difficulties of killing the existing grass and depleting the seed bank before planting native species. Many of these undesirable grasses are still recommended and sold for new waterway plantings, soil stabilization and some CRP practices;
- Other aggressive, broad-leafed species can invade both native and restored prairie and become monotypic stands with little diversity. This lack of diversity decreases the habitat quality for wildlife by decreasing the amount of insects attracted to flowering plants throughout the growing season provided by native forbs. Canada goldenrod, Teasel sp., Vetch sp., Sericea lespedeza, etct;
- Invasive species often change habitat composition and reduce habitat quality.

Action Item:

- continue removal and control (chemical, mechanical and biological) of invasive exotic plants, especially within high quality natural areas

Table X.X: Early Detection Priority Species

Early Detection Species	Scientific Name	Category	Habitat	Campaign	SGCN (or group) threatened	Comments
Hydrilla	Hydrilla verticillata	Aquatic plant	Lakes/reservoirs, backwaters	Streams		
Exotic Faucet Snail (and associated helminths)	Bithynia tentaculata	Aquatic mollusk	Rivers, backwaters, lakes/reservoirs	Wetlands, Streams	Waterfowl SGCN	
Didymo (rocksnot)	Didymosphenia geminata	Aquatic diatom	Streams	Streams	Aquatic invertebrates, mussels, stream fish	
Japanese Stiltgrass	Microstegium vimineum	Terrestrial plant	Floodplain forest, upland forest	Forests and Woodlands		ED species only for northern ½ of Illinois
Japanese Chaff Flower	Achyranthes japonica	Terrestrial plant	Floodplain forest, upland forest	Forests and Woodlands		ED species only for northern ¾ of Illinois
Salt Cedar	Tamarix sp.	Terrestrial/wetland plant	Floodplain forest, riparian areas, Wet mudfloat/Moist soil plants	Streams, wetlands, Forests and Woodlands		
New Zealand Mudsnail	Potamopyrgus antipodarum	Aquatic mollusk	Streams	Streams		
Lesser Celandine	Ficaria verna	Terrestrial plant	Floodplain forest	Forest and Woodlands		
Asian Longhorned Beetle	Anoplophora glabripennis	Terrestrial insect / Wood boring beetle	Hardwood tree species	Green Cities, Forest and Woodlands		
Gypsy Moth	Lymantria dispar	Terrestrial insect	Hardwood tree species	Green Cities, Forest and Woodlands	SGCN reliant on mature hardwood forests	ED Species only for southern ¾ of Illinois
Feral Swine	Sus scrofa	Terrestrial animal	Floodplain forest, upland forest, Agriculture field,	Forest and Woodlands, Farmland and Prairie	Ground nesting bird SGCN,	Occurs in low densities in Illinois, active elimination program ongoing
Thousand Cankers Disease /	Geosmithia morbida and Pityophthorus	Insect/pathogen complex	Black Walnut trees	Green Cities, Forest and	SGCN reliant on black walnut	

Walnut Twig Beetle	juglandis			Woodlands		

Table x.x: Species in Greatest Conservation Need severely threatened or stressed from Invasive/Exotic Species

Comment [CE4]: Based upon SGCN info from original IWAP, will update when new info is available.

Appendix II in the original IWAP (2005) was analyzed to determine which species we had a high confidence was rated that invasive species has had, is having, or is likely to have a severe effect on population viability or abundance, either through a habitat stress of a community stress.

Habitat stress = novel species that are changing a habitat (i.e. mostly invasive plants)
Community stress = novel animals functioning as competitors, predators, parasites, etc.
Habitat associations for these species from Appendix I were used to place each SGCN under a Campaign

Farmland and Prairie Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Species	Common	Group	Habitat	Campaign	Habitat	Community
Ammodramus henslowii	(Henslow's Sparrow)	Birds	Grassland	Farmland & Prairie	Severe	
Ammodramus savannarum	(Grasshopper Sparrow)	Birds	Grassland	Farmland & Prairie	Severe	
Asio flammeus	(Short-eared Owl)	Birds	Grassland	Farmland & Prairie	Severe	
Bartramia longicauda	(Upland Sandpiper)	Birds	Grassland	Farmland & Prairie	Severe	
Circus cyaneus	(Northern Harrier)	Birds	Grassland, marsh	Farmland & Prairie	Severe	
Colinus virginianus	(Northern Bobwhite)	Birds	Successional field, grassland	Farmland & Prairie	Severe	
Dendroica discolor	(Prairie Warbler)	Birds	successional	Farmland & Prairie		Severe
Dolichonyx oryzivorus	(Bobolink)	Birds	Grassland	Farmland & Prairie	Severe	
Empidonax trailli	(Willow Flycatcher)	Birds	marsh, successional	Farmland & Prairie	Severe	Severe
Lanius ludovicianus	(Loggerhead Shrike)	Birds	Grassland	Farmland & Prairie	Severe	
Passerculus sandwichensis	(Savannah Sparrow)	Birds	Grassland, agricultural	Farmland & Prairie	Severe	
Spiza americana	(Dickcissel)	Birds	Grassland	Farmland & Prairie	Severe	
Spizella pusilla	(Field Sparrow)	Birds	successional	Farmland & Prairie		Severe
Tympanuchus cupido	(Greater Prairie-chicken)	Birds	Grassland	Farmland & Prairie	Severe	

Forest and Woodlands Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Species	Common	Group	Habitat	Campaign	Habitat	Community
Colaptes auratus	(Northern Flicker)	Birds	savanna, grassland	Forest & Woodlands		Severe
Dendroica cerulea	(Cerulean Warbler)	Birds	Bottomland forest	Forest & Woodlands		Severe
Empidonax virescens	(Acadian Flycatcher)	Birds	forest	Forest & Woodlands		Severe
Helmitheros vermiforma	(Worm-eating Warbler)	Birds	forest	Forest & Woodlands		Severe
Hylocichla mustelina	(Wood Thrush)	Birds	forest	Forest & Woodlands		Severe
Melanerpes erythrocephalus	(Red-headed Woodpecker)	Birds	Savanna	Forest & Woodlands	Severe	Severe
Vermiforma pinus	(Blue-winged Warbler)	Birds	successional, forest	Forest & Woodlands		Severe

Wetlands Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Species	Common	Group	Habitat	Campaign	Habitat	Community
Anas rubripes	(American Black duck)	Birds	Forested streams, lakes	Wetlands		Severe
Botaurus lentiginosus	(American Bittern)	Birds	Marsh	Wetlands	Severe	
Chlidonias niger	(Black Tern)	Birds	Marsh	Wetlands	Severe	
Cistothorus palustris	(Marsh Wren)	Birds	Marsh	Wetlands	Severe	
Gallinago delicatata	(Wilson's snipe)	Birds	Marsh, vernal pool	Wetlands	Severe	
Gallinula chloropus	(Common Moorhen)	Birds	Marsh	Wetlands	Severe	
Ixobrychus exilis	(Least Bittern)	Birds	Marsh	Wetlands	Severe	
Nyctanassa violacea	(Yellowcrowned Night-heron)	Birds	Swamp	Wetlands	Severe	
Nycticorax nycticorax	(Blackcrowned Night-heron)	Birds	Swamp	Wetlands	Severe	
Phalaropus tricolor	(Wilson's Phalarope)	Birds	Marsh, vernal pool	Wetlands	Severe	
Rallus elegans	(King Rail)	Birds	Marsh, grassland	Wetlands	Severe	
Sterna forsteri	(Forster's Tern)	Birds	Marsh	Wetlands	Severe	
Xanthocephalus xanthocephalus	(Yellow-headed Blackbird)	Birds	Marsh	Wetlands	Severe	
Emydoidea blandingii	(Blanding's Turtle)	Reptile	marsh	Wetlands	Severe	

Streams Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Species	Common	Group	Habitat	Campaign	Habitat	Community
Podilymbus podiceps	(Pied-billed Grebe)	Birds	Marsh, lakes	Streams	Severe	
Cycleptus elongatus	(Blue Sucker)	Fish	rivers w/ rocky substrate	Streams		Severe
Etheostoma camurum	(Bluebreast Darter)	Fish	rivers w/ rocky substrate	Streams		Severe

Lake Michigan Campaign

SGCN with high confidence of a severe threat from Invasive/Exotic Species

Species	Common	Group	Habitat	Campaign	Habitat	Community
Sterna hirundo	(Common Tern)	Birds	Beach	Lake Michigan	Severe	
Cottus bairdi	(Mottled Sculpin)	Fish	Lake Michigan	Lake Michigan		Severe
Perca flavescens	(Yellow Perch)	Fish	Lake Michigan	Lake Michigan	Severe	Severe